On the Formation of Fat in the Intestines of living Animals. *By* Sir Everard Home, *Bart.* *Presented by the Society for promoting the Knowledge of Animal Chemistry.* Read March 18, 1813. [*Phil. Trans.* 1813, *p.* 146.]

In the course of the author's inquiries respecting the digestive organs of different animals, he has been gradually led to suppose that the office of the colon and lower intestines in general is different from that of the upper. In the stomach and small intestines the process of forming and separating the chyle is carried on; but after the food has passed into the cæcum and colon, it appears to undergo a total change in its appearance and smell, with some tendency to putrefaction, that is not observable in the contents of the small intestines, and is prevented from being communicated to them by a valve that does not allow even gases to pass upwards into the small intestines.

The general construction also of the colon and cæca favours the opinion that the functions which they perform are of a different kind; since their capacity and arrangement would occasion the passage of their contents to be more tardy than it is through the small intestines. The smell and semi-putrescent state of these matters led to a comparison of them with animal substances buried in the ground in moist situations, which are known to be converted into adipocere, and suggested the possibility that the secondary digestive operation performed in the lower intestines might be the formation of fat; and this conjecture appeared to the author to be supported by the consideration, that fat is the winter supply in dormant animals, and that these animals have a formation of intestines peculiar to themselves, in which there is no valve to distinguish the beginning of the colon, and no other impediment to the *free* supply of materials for the production of fat.

The author next adduces an instance of the conversion of a corpse into adipocere (in the course of twenty-one years) in Shoreditch churchyard; and compares the situation of feculent matters retained in the cells of the colon with a current of more fluid matters passing over them with that of bodies buried in the neighbourhood of a common sewer; and he enumerates various instances in which substances of a fatty nature are known to be formed in the large intestines.

Ambergris, for example, is never found excepting in the last seven feet of the intestines of the spermaceti whale. In the human intestines also fatty concretions are sometimes found, called scybala, and these have a considerable resemblance to ambergris.

One instance of the formation of fatty concretions in the intestines appeared to have occurred in consequence of having swallowed large quantities of common olive oil. The consistence of these is compared to that of soft wax, and by analysis they appeared to consist of two thirds olive oil, and one third animal mucus.

A second instance is noticed, which, as well as the preceding, was observed by Dr. Babington in a child $4\frac{1}{2}$ years old, *subject to jaundice*, who has voided for some time past at intervals of ten days

or a fortnight, as much as two or three ounces at a time, of a yellow oily fluid that concretes when cold.

In consequence of such instances of fat existing in considerable quantities in the lower intestines, the author endeavoured to ascertain whether it might not be found in the common contents of the colon, and preferred those from the duck as the subject of experiment. Mr. Brande, who undertook to make this experiment for the author, divided the matter into two parts, which were kept for a week at a temperature varying from 40° to 60°; one in pure water, the other in extremely dilute nitrous acid. In the former no perceptible quantity of fat was found; but the latter yielded by this treatment about one eighth part of fat.

When a similar experiment was made on the contents of the rectum, there was no appearance of fat produced even by the action of nitric acid.

As it appeared possible that bile might perhaps assist in the conversion of animal substances into fat, the author requested Mr. Brande to try the effect of mixing muscular flesh with bile. Human muscle when digested with water alone, at the temperature of 100°, for four days, became slightly putrid without any appearance of fat; but when digested with human bile at the same temperature it became fetid on the second day, fetid and yellow on the third, and on the fourth it had the smell of excrement, was flabby, and appeared fatty on the surface.

A second experiment on beef in the bile of the ox had the same result as the preceding.

In a third experiment made also on beef with ox-bile at the temperature of 60°, there was no appearance of fat at the end of six days; and in a fourth experiment made again at 100°, there was again no appearance of grease produced by the process.

From these experiments, says the author, we learn that the bile has the power of converting animal substances into fat; that the temperature of 100°, or nearly so, is necessary for that process; and that the change is produced just as putrefaction is beginning to take place.

With a view to ascertain whether the same process could be detected actually going on in the human intestines, a quantity of fæces that had been retained upwards of six days were examined by being mixed with water at the temperature of 100°, and allowed to cool, when a film that appeared to be of an oily nature was found on the surface.

If, then, it be admitted that the origin of fat is such as is here conceived by the author, he remarks that the wasting of the body in various disorders of the lower bowels is accounted for. The uses of the various turns of the colon in different animals will be explained, and the origin of fatty concretions in the gall-bladder, which are so common, may be supposed to arise from the action of the bile on the mucus secreted from its coats.